PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	**FOR FURTHER ACTION** see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
8K25PC		
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/EP 99/ 08783	15/11/1999	16/11/1998
Applicant		
TELEFONKTIEBOLAGET L M ERICSSON (publ) et al.		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.

[X] It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

a. With regard to the **language,** the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

[ ] the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

[ ] contained in the international application in written form.

[ ] filed together with the international application in computer readable form.

[ ] furnished subsequently to this Authority in written form.

[ ] furnished subsequently to this Authority in computer readble form.

[ ] the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

[ ] the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. [ ] **Certain claims were found unsearchable** (See Box I).

3. [ ] **Unity of invention is lacking** (see Box II).

4. With regard to the **title,**

[X] the text is approved as submitted by the applicant.

[ ] the text has been established by this Authority to read as follows:

5. With regard to the **abstract,**

[X] the text is approved as submitted by the applicant.

[ ] the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No. 2

[ ] as suggested by the applicant.

[ ] because the applicant failed to suggest a figure.

[X] because this figure better characterizes the invention.

[ ] None of the figures.

INTERNATIONAL SEARCH REPORT

International Application No
T/EP 99/08783

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04Q3/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0 841 831 A (AT & T CORP) 13 May 1998 (1998-05-13) column 3, line 29 -column 4, line 30 column 5, line 50 -column 6, line 37 claims 1-16	1-5
A	US 5 764 750 A (CHAU TOAN ET AL) 9 June 1998 (1998-06-09) column 1, line 49 -column 2, line 48 claims 1-15	1-5

-/--

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
10 April 2000	02/05/2000

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Chassatte, R

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Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

International Application No
[redacted]T/EP 99/08783

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
A	THOM G A: "H. 323: THE MULTIMEDIA COMMUNICATIONS STANDARD FOR LOCAL AREA NETWORKS" IEEE COMMUNICATIONS MAGAZINE,US,IEEE SERVICE CENTER. PISCATAWAY, N.J, vol. 34, no. 12, 1 December 1996 (1996-12-01), pages 52-56, XP000636454 ISSN: 0163-6804 the whole document	

1

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/EP 99/08783

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0841831 A	13-05-1998	CA 2217838 A	07-05-1998
		JP 10173696 A	26-06-1998
US 5764750 A	09-06-1998	US 5550906 A	27-08-1996
		AU 684967 B	08-01-1998
		AU 2832095 A	15-02-1996
		CA 2149462 A,C	06-02-1996
		EP 0696124 A	07-02-1996
		JP 8065383 A	08-03-1996

P. ENT COOPERATION TREA

3

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

To:

Assistant Commissioner for Patents
United States Patent and Trademark Office
Box PCT
Washington, D.C.20231
ETATS-UNIS D'AMERIQUE

in its capacity as elected Office

Date of mailing (day/month/year) 18 July 2000 (18.07.00)	
International application No. PCT/EP99/08783	**Applicant's or agent's file reference** 8K25PC
International filing date (day/month/year) 15 November 1999 (15.11.99)	**Priority date** (day/month/year) 16 November 1998 (16.11.98)
Applicant GRAF, Leslie et al	

1. The designated Office is hereby notified of its election made:

[X] in the demand filed with the International Preliminary Examining Authority on:

07 June 2000 (07.06.00)

[ ] in a notice effecting later election filed with the International Bureau on:

2. The election [X] was

[ ] was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No.: (41-22) 740.14.35	Authorized officer Zakaria EL KHODARY Telephone No.: (41-22) 338.83.38

Form PCT/IB/331 (July 1992)

EP9908783

PATENT COOPERATION TREATY

16 -02- 2001

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To:

BORENIUS & CO OY AB
Kansakoulukuja 3
FI-00100 Helsinki
FINLANDE

PCT

NOTIFICATION OF TRANSMITTAL OF
THE INTERNATIONAL PRELIMINARY
EXAMINATION REPORT
(PCT Rule 71.1)

Date of mailing *(day/month/year)*	15.02.2001
Applicant's or agent's file reference 8K25PC	**IMPORTANT NOTIFICATION**

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/EP99/08783	15/11/1999	16/11/1998

Applicant
TELEFONKTIEBOLAGET L M ERICSSON (publ) et al.

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the international application.

2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.

3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.

4. **REMINDER**

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary examination report. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

Name and mailing address of the IPEA/	Authorized officer
European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Finnie, A Tel.+49 89 2399-8251

Form PCT/IPEA/416 (July 1992)

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
8K25PC		
International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/EP99/08783	15/11/1999	16/11/1998
International Patent Classification (IPC) or national classification and IPC		
H04Q3/00		
Applicant		
TELEFONKTIEBOLAGET L M ERICSSON (publ) et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

   ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of 1 sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the report
   - II ☐ Priority
   - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☐ Lack of unity of invention
   - V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations suporting such statement
   - VI ☐ Certain documents cited
   - VII ☒ Certain defects in the international application
   - VIII ☒ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
07/06/2000	15.02.2001
Name and mailing address of the international preliminary examining authority:	Authorized officer
European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Pais Gonçalves, A Telephone No. +49 89 2399 8806

Form PCT/IPEA/409 (cover sheet) (January 1994)

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/EP99/08783

I. Basis of the report

1. This report has been drawn on the basis of *(substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments (Rules 70.16 and 70.17).)*:
Description, pages:

1-6	as originally filed			
7	as received on	02/11/2000	with letter of	02/11/2000

Claims, No.:

1-5	as originally filed

Drawings, sheets:

1/1	as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

   These elements were available or furnished to this Authority in the following language: , which is:

   - ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
   - ☐ the language of publication of the international application (under Rule 48.3(b)).
   - ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

   - ☐ contained in the international application in written form.
   - ☐ filed together with the international application in computer readable form.
   - ☐ furnished subsequently to this Authority in written form.
   - ☐ furnished subsequently to this Authority in computer readable form.
   - ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
   - ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

   (Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims 1-5
	No:	Claims
Inventive step (IS)	Yes:	Claims 1-5
	No:	Claims
Industrial applicability (IA)	Yes:	Claims 1-5
	No:	Claims

2. Citations and explanations
   see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the International application have been noted:
see separate sheet

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:
see separate sheet

V.

The present invention relates to a method of communicating signalling data between a pair of telecommunication switches (Claim 1) using a Q.931 protocol, as well as to a corresponding apparatus (Claim 5).

A **problem** with the conventional methods and systems is related to the fact that the Q.931 protocol does not support certain types of signalling messages, in particular, when trying to transmit a ISUP network discard indicator between the switches indicating that a switch has discarded the signalling information. As a consequence, the calling party may be overcharged.

The **solution** proposed by the present invention is based on using reserved values of the notification indicator field of a notify message of the Q.931 standard to transmit said ISUP network discard indicator

EP-A-0 841 831 discloses an apparatus for establishing a communication between terminals and comprising a call setup translator providing a translation of protocols. US-A-5 764 750 discloses a multi-protocol telecommunications system being able to communicate with different terminals using different protocols. The paper "H.323: The Multimedia Communications Standard for Local Area Networks" only discloses the recommendations of the H.323 standard and relates thus merely to the background art of the present invention.

Consequently, the claimed subject-matter is not disclosed in or rendered obvious by the available prior art and Claims 1 and 5 fulfil thus the requirements of Article 33(1) PCT in respect of novelty, inventive step and industrial applicability. The same applies to dependent Claims 2 to 4, containing further refinements of the embodiment of Claim 1.

VII.

1. The document EP-A-0 841 831 was not **acknowledged** and briefly discussed in the opening part of the description, Rule 5.1 (a) (ii) PCT, making clear the inventive contribution of the claimed invention over the prior art.

2. The claims do not include **reference signs** relating to the features referred to therein, Rule 6.2 (b) PCT.

VIII.

Claims 1 and 5 are not clear, Article 6 PCT, because they attempt to define the scope of protection by the **result to be achieved**, Guidelines PG-III 4.7.

In particular, they indicate that the protocol is extended to provide for the transmission of the network discard indicator message but they do not define how this is achieved, i.e. by assigning said network discard indicator message to reserved values of a notify message (cf. description pages 6 and 7).

Bits 7 6 5 4 3 2 1	
0 0 0 0 0 0 0	User suspended
0 0 0 0 0 0 1	User resumed
0 0 0 0 0 1 0	Bearer service change

All other values are currently reserved.

What is proposed here is an extension to the Q.931 protocol to provide for the Network Discard Indicator message. This message is assigned to any one of the reserved values of the Notification Indicator element.

Figure 2 is a flow chart illustrating the steps involved in relaying a Network Discard Indicator message from the PSTN exchange 3 to the ISDN exchange 1.

It will be appreciated by the person of skill in the art that various modifications may be made to the above described embodiment without departing from the scope of the present invention as defined by the appended claims. For example, whilst the above embodiment describes the inclusion of the Network Discard Indicator message in the Q.931 NOTIFY message, other messages may be used for which there currently exists reserved values. The exchanges (or switches) between which the Network Discard Indicator message is sent may be coupled via one or more intermediate switches, with the IP network extending only over an intermediate portion of the signalling connection, e.g. between two intermediate exchanges. In such a case, the Network Discard Indicator message may be generated either at the terminating or originating exchange, or at one of the intermediate exchanges. The Network Discard Indicator message may be placed directly onto the IP network by the exchange at which the message is generated, or it may first be transmitted to an intermediate exchange over, for example, a Signalling System No.7 (SS7) signalling network.

Bits 7 6 5 4 3 2 1	
0 0 0 0 0 0 0	User suspended
0 0 0 0 0 0 1	User resumed
0 0 0 0 0 1 0	Bearer service change

All other values are currently reserved.

What is proposed here is an extension to the Q.931 protocol to provide for the Network Discard Indicator message. This message is assigned to any one of the reserved values of the Notification Indicator element.

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WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 7 : H04Q 3/00

A1

(11) International Publication Number: WO 00/30370

(43) International Publication Date: 25 May 2000 (25.05.00)

(21) International Application Number: PCT/EP99/08783

(22) International Filing Date: 15 November 1999 (15.11.99)

(30) Priority Data:
982472 16 November 1998 (16.11.98) FI

(71) Applicant *(for all designated States except US)*: TELEFONAKTIEBOLAGET LM ERICSSON (publ) [SE/SE]; S-126 25 Stockholm (SE).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: GRAF, Leslie [AU/AU]; 3 Hender Court, Ballwyn, Melbourne, VIC 3103 (AU). RYTINA, Ian [AU/AU]; 28/25 Barkly Street, Carlton, VIC 3053 (AU). GROVES, Christian [AU/AU]; 21 Garden Avenue, Keilor, VIC 3036 (AU).

(74) Agent: BORENIUS & CO OY AB; Kansakoulukuja 3, FIN-00100 Helsinki (FI).

(81) Designated States: AE, AL, AM, AT, AT (Utility model), AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, CZ (Utility model), DE, DE (Utility model), DK, DK (Utility model), DM, EE, EE (Utility model), ES, FI, FI (Utility model), GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SK (Utility model), SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published

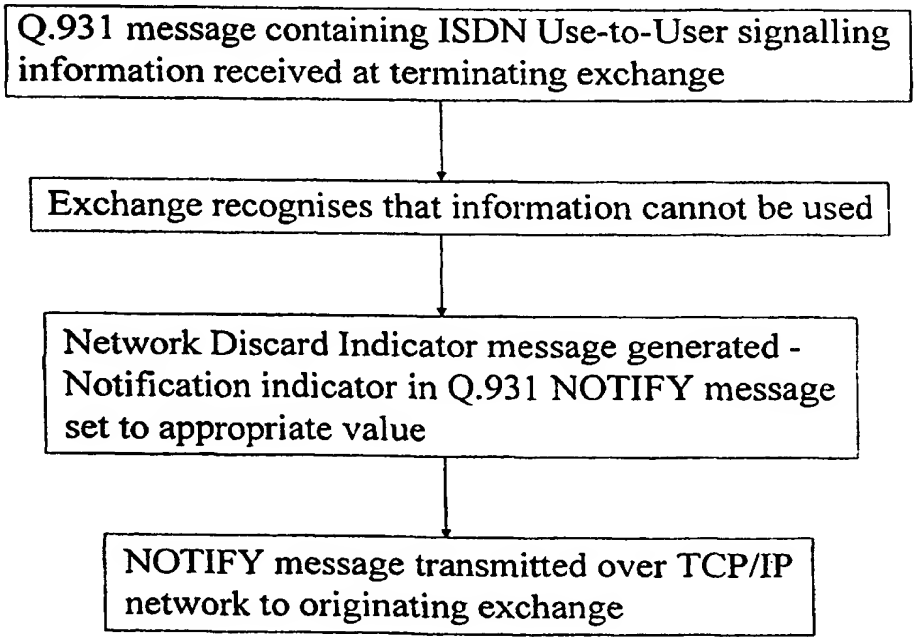
With international search report.

Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.

(54) Title: SIGNALLING IN A TELECOMMUNICATIONS SYSTEM

(57) Abstract

A method of communicating signalling data between a pair of telecommunication exchanges (1,3) employing ISUP signalling, via a packet switched data network. The method comprising using H.323 protocol to communicate over the data network where signalling data is carried by a Q.931 based protocol extended to provide for the transmission of the ISUP Network Discard Indicator message.



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Signalling in a Telecommunications System

Field of the Invention

The present invention relates to signalling in a telecommunications system and more particularly to the transmission of signalling data over a packet switched network.

Background to the Invention

Conventional telecommunications networks for conveying voice and other user information have in general relied upon dedicated telecommunications network infrastructure and transmission protocols. However, with the recent explosive growth in digital data transmission, driven in particular by the use of intranets and the Internet, there has been a move towards the use of more generic infrastructure and transmission protocols in the telecommunications industry. This move is driven primarily by the desire for interoperability between telecommunications networks and other data networks, and secondarily by the cost and performance advantages which general data network systems offer over conventional telecommunications systems.

In 1996, the International Telecommunications Union (ITU) defined a standard for the transmission of multimedia data over Local Area Networks (LANs) as well as "internetworks" composed of multiple interconnected LANs. This standard is known as H.323, whilst the 1998 revision is known as H.323 Version 2. A fundamental and essential component of H.323 is the provision for the transmission of digitised and compressed voice data. However, H.323 also makes optional provision for the transmission of video and other data forms.

H.323 makes mandatory the use of the ITU standard Q.931 for the negotiation of a call set-up between two H.323 terminals, to establish a channel therebetween over which the terminals may send user and signalling data. In addition, Q.931 is mandatory for certain call maintenance and termination functions.

Perhaps the most advanced telecommunications network protocol is that known as International Standard Digital Network (ISDN). In the link between a subscriber and that subscriber's local exchange (the subscriber "access point"), ISDN uses a signalling protocol known as Digital Subscriber Signalling System No.1 (DSS1), whilst a further protocol known as ISDN User Part (ISUP) is used to convey signalling data within the network, i.e. inter-exchange signalling. ISUP is also used more generally in inter-exchange signalling even in networks which do not make use of an ISDN access network, e.g. where the access network is a Public Switched Telephone Network (PSTN)

In the current competitive telecommunications market, it is vital for a telecom operator to provide a wide and varied range of value added services, as well as to minimise the cost of services to the end users. As such, existing telecommunications network protocols, and in particular ISUP, have evolved to provide for the transfer of many messages and parameters relating to such services between the various nodes (or signalling points) of the networks.

As the Q.931 signalling protocol is largely based upon the DSS1 protocol, interworking between ISUP and H.323 is generally satisfactory. It is therefore possible to replace intermediate portions of an ISUP network with an H.323 network (or rather a TCP/IP network which uses the H.323 protocol). For example, the connection between two telephone switches, e.g. exchanges, could be made via an H.323 network.

Summary of the Present Invention

The inventors of the present invention have discovered that the existing Q.931 based signalling protocol employed by H.323 is not able to accommodate certain messages generated within an ISUP based network. More particularly, it has been discovered that the existing Q.931 based signalling protocol is unable to accommodate the Network Discard Indicator message which may be generated at a switch of a telecommunication network in the event that the switch does not support User-to-User signalling information contained in a received Q.931 message. This deficiency in the Q.931 based signalling protocol means that there is no way in which the switch, from which the User-to-User signalling information originated, can be informed for example that the receiving switch has discarded the signalling information. In certain circumstances this may lead to overcharging of the calling party.

It is an object of the present invention to overcome or at least mitigate the above noted disadvantages of existing telecommunication signalling systems. It is a further object of the present invention to provide a telecommunications system in which a packet switched network is used to carry user voice and data information and signalling data and in which a Network Discard Indicator message may be transmitted over the network between a pair of switches.

According to a first aspect of the present invention there is provided a method of communicating signalling data between a pair of telecommunication switches employing ISUP signalling, via a packet switched data network, the method comprising using H.323 protocol to communicate over the data network where signalling data is carried by a Q.931 based

protocol extended to provide for the transmission of the ISUP Network Discard Indicator message.

Preferably, the extended Q.931 protocol employed by the present invention is arranged to be applied within an H.323 protocol stack. More preferably, said connection or part of a connection formed between the subscriber parties is provided over a TCP/IP based network. This network may be a LAN, an internetwork, the Internet, or a combination of two or more of these. In these cases, the H.323 protocol stack is provided over a TCP/IP protocol stack.

According to a second aspect of the present invention there is provided apparatus for communicating signalling data between a pair of telecommunication network switches employing ISUP signalling, via a packet switched data network, the apparatus comprising means for using H.323 protocol to communicate over the data network where signalling data is carried by a Q.931 based protocol extended to provide for the transmission of Network Discard Indicator messages.

Brief Description of the Drawings

For a better understanding of the present invention and in order to show how the same may be carried into effect reference will now be made, by way of example, to the accompanying drawings, in which:

Figure 1 illustrates schematically a telecommunications network in which user and signalling data is carried between exchanges of the network via an IP network; and

Figure 2 is a flow diagram illustrating the transmission of Network Discard Indicator messages in the network of Figure 1.

Detailed Description of Certain Embodiments

In the telecommunications network of Figure 1, a first telephone exchange 1 is coupled to a subscriber terminal 2 via an ISDN access network (i.e. which uses the DSS1 signalling protocol), whilst a second exchange 3 is coupled to a subscriber terminal 4 via a PSTN access network. Interexchange signalling within the network is carried using ISUP protocol messages requiring the provision at the PSTN exchange 3 of a PSTN/ISUP interface 5. In the case of a call between the two subscriber terminals 2,4, the terminal 2 from which the call is established is referred to as the "calling party" whilst the other terminal 4 is referred to as the "called party". It will also be appreciated that the terminals 2,4 may be connected to respective access exchanges 1,2 via intermediate routing nodes (e.g. multiplexers/demultiplexers).

The following description builds upon the disclosures of the ITU H.323 standard which makes mandatory the use of a Q.931 based standard for establishing and maintaining a call connection between two H.323 enabled terminals. In the example illustrated in Figure 1, the two exchanges 1,3 of the telecommunications network communicate via respective H.323 enabled terminals 6,7 which in turn communicate with each other over an IP based network 8. At the H.323 terminals 6,7, the H.323 protocol stacks lie on top of TCP/IP protocol layers such that the H.323 data may be conveyed between the exchanges over the IP network 8. Thus, at each exchange there exists a protocol stack consisting of ISUP over Q.931 over TCP/IP.

Consider the situation where the calling party 2 wishes to send certain User-to-User signalling information to the called party 4 during the call set-up procedure and which is facilitated by the ISDN access network available to the calling party 2. This information may include, for example, call forwarding information, call waiting information, or

the like. The information is encapsulated at the access exchange 1,6 in an appropriate Q.931 message and is sent over the H.323 network 8 to the terminating exchange 3,5,7. Now assume that the terminating exchange 3 is incapable of making use of the received User-to-User signalling information. In this case the terminating exchange 3 must generate a Network Discard Indicator message, encapsulate it within a Q.931 message, and transmit the resulting Q.931 message back to the originating exchange over the IP network 8.

The Q.931 standard defines a NOTIFY message having the following structure, where the Reference indicates the corresponding Information element reference in the Q.931 standard, Direction indicates the direction(s) in which an element may be carried by the NOTIFY message (n = network, u = H.323 user), and Length indicates the length of the element in octets:

Information element	Reference (subclause)	Direction	Type	Length
Protocol discriminator	4.2	Both	M	1
Call reference	4.3	Both	M	2
Message type	4.4	Both	M	1
Bearer capability	4.5	n → u	O	2-12
Notification indicator	4.5	Both	M	3
Display	4.5	n → u	O	≥2

Of the six message elements, the Notification Indicator element is defined in the existing Q.931 standard as having three meaningful values or states. These are:

Bits 7	6	5	4	3	2	1	
0	0	0	0	0	0	0	User suspended
0	0	0	0	0	0	1	User resumed
0	0	0	0	0	1	0	Bearer service change

All other values are currently reserved.

What is proposed here is an extension to the Q.931 protocol to provide for the Network Discard Indicator message. This message is assigned to any one of the reserved values of the Notification Indicator element.

Figure 2 is a flow chart illustrating the steps involved in relaying a Network Discard Indicator message from the PSTN exchange 3 to the ISDN exchange 1.

It will be appreciated by the person of skill in the art that various modifications may be made to the above described embodiment without departing from the scope of the present invention. For example, whilst the above embodiment describes the inclusion of the Network Discard Indicator message in the Q.931 NOTIFY message, other messages may be used for which there currently exists reserved values. The exchanges (or switches) between which the Network Discard Indicator message is sent may be coupled via one or more intermediate switches, with the IP network extending only over an intermediate portion of the signalling connection, e.g. between two intermediate exchanges. In such a case, the Network Discard Indicator message may be generated either at the terminating or originating exchange, or at one of the intermediate exchanges. The Network Discard Indicator message may be placed directly onto the IP network by the exchange at which the message is generated, or it may first be transmitted to an intermediate exchange over, for example, a Signalling System No.7 (SS7) signalling network.

Claims

1. A method of communicating signalling data between a pair of telecommunication switches employing ISUP signalling, via a packet switched data network, the method comprising using H.323 protocol to communicate over the data network where signalling data is carried by a Q.931 based protocol extended to provide for the transmission of the ISUP Network Discard Indicator message.

2. A method according to claim 1, wherein the extended Q.931 protocol is arranged to be applied within an H.323 protocol stack.

3. A method according to claim 2, wherein said connection or part of a connection formed between the subscriber parties is provided over a TCP/IP network.

4. A method according to claim 3, wherein the H.323 protocol stack is provided over a TCP/IP protocol stack.

5. Apparatus for communicating signalling data between a pair of telecommunication network switches employing ISUP signalling, via a packet switched data network, the apparatus comprising means for using H.323 protocol to communicate over the data network where signalling data is carried by a Q.931 based protocol extended to provide for the transmission of Network Discard Indicator messages.

1/1

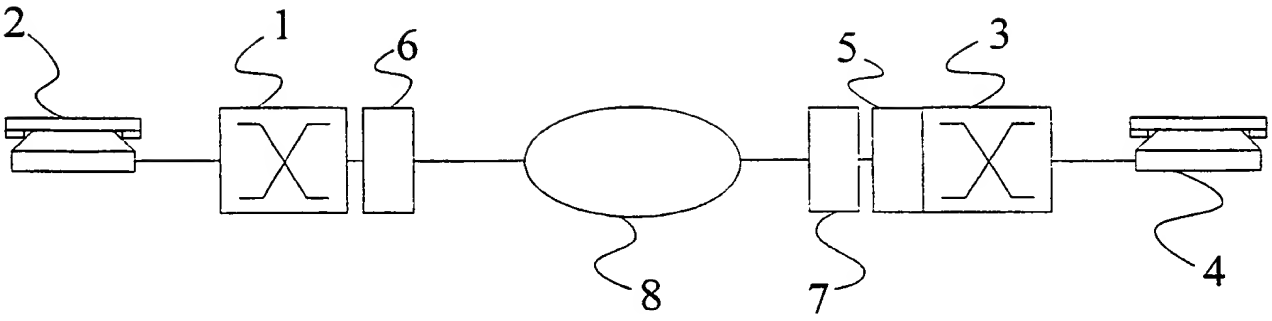
2
1
6
5
3
8
7
4

Fig. 1

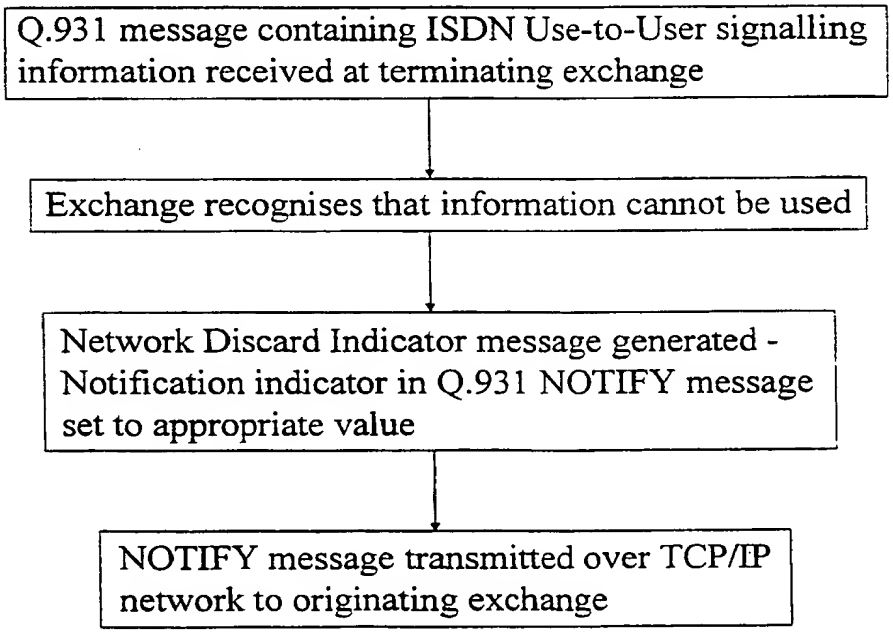
Q.931 message containing ISDN Use-to-User signalling information received at terminating exchange
Exchange recognises that information cannot be used
Network Discard Indicator message generated - Notification indicator in Q.931 NOTIFY message set to appropriate value
NOTIFY message transmitted over TCP/IP network to originating exchange

Fig. 2

INTERNATIONAL SEARCH REPORT

International Application No
PCT/EP 99/08783

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04Q3/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0 841 831 A (AT & T CORP) 13 May 1998 (1998-05-13) column 3, line 29 -column 4, line 30 column 5, line 50 -column 6, line 37 claims 1-16	1-5
A	US 5 764 750 A (CHAU TOAN ET AL) 9 June 1998 (1998-06-09) column 1, line 49 -column 2, line 48 claims 1-15	1-5

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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
10 April 2000	02/05/2000

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31–70) 340–2040, Tx. 31 651 epo nl, Fax: (+31–70) 340–3016	Chassatte, R

Form PCT/ISA/210 (second sheet) (July 1992)

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
A	THOM G A: "H. 323: THE MULTIMEDIA COMMUNICATIONS STANDARD FOR LOCAL AREA NETWORKS" IEEE COMMUNICATIONS MAGAZINE,US,IEEE SERVICE CENTER. PISCATAWAY, N.J, vol. 34, no. 12, 1 December 1996 (1996-12-01), pages 52-56, XP000636454 ISSN: 0163-6804 the whole document	

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/EP 99/08783

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0841831 A	13-05-1998	CA 2217838 A	07-05-1998
		JP 10173696 A	26-06-1998
US 5764750 A	09-06-1998	US 5550906 A	27-08-1996
		AU 684967 B	08-01-1998
		AU 2832095 A	15-02-1996
		CA 2149462 A,C	06-02-1996
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